U.S. Department of Energy
Hanford Site

July 30, 2020

20-PFD-0043

Ms. Alexandra K. Smith, Program Manager
Nuclear Waste Program
Washington State Department of Ecology
3100 Port of Benton Boulevard
Richland, Washington 99354

Dear Ms. Smith:

U.S. DEPARTMENT OF ENERGY DECISION TO CLASSIFY THE INTEGRATED DISPOSAL FACILITY'S LEACHATE COLLECTION TANKS DANGEROUS WASTE MANAGEMENT UNITS IN THE RESOURCE CONSERVATION AND RECOVERY ACT PERMITTING AS TANK SYSTEMS

On March 6, 2020, the U.S. Department of Energy, Richland Operations Office (RL) received the Washington State Department of Ecology (Ecology) letter 20-NWP-047 with the completeness determination of the Integrated Disposal Facility (IDF) Operations Class 3 Permit Modification for the Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit. The completeness determination found the class-3 permit modification submittal to be incomplete. A major issue listed by Ecology in the determination centers on including the Leachate Collection Tanks (LCT) into the IDF permit as Dangerous Waste Management Units (DWMU):

> "One final issue that Ecology believes needs to be addressed in the IDF Dangerous Waste Permit is the proper classification of the Leachate Collection Tanks (LCTs). Based on the current technical information, the LCTs should be permitted as Dangerous Waste Management Units (DWMUs) in the IDF Permit prior to the initial receipt of waste. Ecology will add an Interim Compliance Schedule Item and associated completion date into the draft IDF Permit to support the second public comment period for this requested modification."

RL agrees the LCTs should be included into the Hanford Facility RCRA Permit as DWMUs. Upon comparison of the design and structure of the IDF LCTs against regulation, RL believes the LCTs are fully compliant with the requirements of Washington Administrative Code (WAC) 173-303-640, "Tank Systems," and should be permitted as such.

However, RL is concerned that the path forward mentioned in letter 20-NPW-047, whereby Ecology adds an interim compliance schedule into the Hanford Facility RCRA Permit may not allow sufficient schedule to develop and implement a permit modification without negatively affecting the startup of the Direct Feed Low Activity Waste program. To help alleviate this concern, the permittees for IDF will immediately begin developing a permit modification request according to WAC 173-303-830, "Permit Changes" to support Ecology's desire to add the LCTs as DWMUs. Two basic assumptions made by RL regarding the permit modification request are as follows:

- LCTs will be incorporated into the Hanford Facility RCRA Permit as "tanks" under WAC 173-303-640 "Tank Systems."
- Ecology concurs that the appropriate modification class for this permit change is a Class 2 modification as derived from WAC 173-303-830 "Permit Changes," Appendix I, G.1.b.

RL appreciates Ecology's support on completing this permit change and requests immediate clarification if the bounding assumptions listed above are not agreeable to Ecology.

If you have any questions, please contact me, or your staff may contact Bill Hamel, Assistant Manager for the River and Plateau, Richland Operations Office, on (509) 373-9971.

Sincerely,

Digitally signed by Brian T. Vance
DN: cn=Brian T. Vance, o=Office of River Protection, ou=Department of Energy, email=brian.t.vance@orp.doe.gov, c=US
Date: 2020.07.30 17:21:05 -07'00'

Brian T. Vance
Manager

PFD:BAS

Attachment:
IDF Leachate Collection Tanks Whitepaper

cc w/attach:
M. Baker, Ecology
D. B. Bartus, EPA
J. Bell, NPT
R. Buck, Wanapum
C. E. Cameron, EPA
L. Contreras, YN
S. L. Dahl-Crumpler, Ecology
D. R. Einan, EPA
M. E. Jones, Ecology
S. Leckband, HAB
N. M. Menard, Ecology
M. Murphy, CTUIR
K. Niles, ODOE
S. N. Schleif, Ecology
N. W. Ware, Ecology
Administrative Record (TSD: D-2-11)
Ecology NWP Library
Environmental Portal
HF Operating Record (J. K. Perry, MSA)

Basis for Permitting the IDF Leachate Collection Tanks as Tank Systems
July 15, 2020

Table of Contents

1.0 Introduction

Under the *Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit, Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous Waste*, Revision 8C (the RCRA Permit), the Integrated Disposal Facility (IDF) is permitted as Operating Unit Group (OUG) 11. The unit group is currently permitted for landfill disposal (handling code D80) and container storage (S01). As described in the RCRA Permit, OUG 11 includes two leachate collection tanks (LCTs) for the collection and storage of leachate generated in the IDF landfill cells. The RCRA Permit states that the LCTs will be operated in accordance with generator provisions of WAC 173-303-200.

A Class 3 permit modification is being prepared to add an additional landfill cell to OUG 11. As part of their review of this Class 3 modification, Ecology commented (Letter 20-NWP-047) that the IDF LCTs should be added to OUG 11 as permitted dangerous waste management units (DWMUs) and not managed under the generator provisions. DOE has agreed to add the tanks to the OUG 11 portion of the RCRA permit as part of a separate permit modification process. In an email dated June 30, 2020, Ecology requested that the permittee develop a written basis for permitting the LCTs as tank systems. In related discussions, Ecology indicated they are also evaluating the possible classification of the LCTs as surface impoundments or miscellaneous units. This paper addresses agency questions about whether the LCTs should be permitted as tanks/tank systems, surface impoundments, or miscellaneous units.

2.0 Definitions

WAC 173-303-040 includes the following definitions that are relevant to this whitepaper.

- "**Miscellaneous unit**" means a dangerous waste management unit where dangerous waste is treated, stored, or disposed of and that is not a container, tank, surface impoundment, pile, land treatment unit, landfill, incinerator, boiler, industrial furnace, underground injection well with appropriate technical standards under 40 C.F.R. Part 146, containment building, corrective action management unit, temporary unit, staging pile, or unit eligible for a research, development, and demonstration permit under WAC 173-303-809.
- "**Surface impoundment**" means a facility or part of a facility which is a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials (although it may be lined with man-made materials), and which is designed to hold an accumulation of liquid wastes or wastes containing free liquids. The term includes holding, storage, settling, and aeration pits, ponds, or lagoons, but does not include injection wells.
- "**Tank**" means a stationary device designed to contain an accumulation of dangerous waste, and which is constructed primarily of nonearthen materials to provide structural support.
- "**Tank system**" means a dangerous waste storage or treatment tank and its associated ancillary equipment and containment system.

3.0 Description of LCT System

Each IDF LCT is constructed of a primary geomembrane liner placed within a secondary geomembrane containment liner. These two liners will act as the floor of the tank and will be bolted to the top of a cylindrical steel tank side wall. Structural support for the liner system is provided by the steel side wall, which is bolted to a reinforced concrete foundation beneath the LCT perimeter. An additional layer of geotextile material creates a cushion between the outer liner and the inside face of the tank shell, as well as between the liner floor of the LCT and the underlying drainage gravel. At the floor of the liner system, a drainage net and leak detection system (LDS) is provided between the primary and secondary liners. A simple graphic of an LCT is provided in Figure 1. A detailed drawing (H-2-830869) is provided in Figure 2. Additional information about the LCT system is provided in the following paragraphs.

An Independent Qualified Registered Professional Engineer (IQRPE) prepared assessment reports for the design of the two LCTs as required by WAC 173-303-640 for design of tank systems: RPP-RPT-25837 and RPP-RPT-27414. At the time these reports were issued, the LCTs were to be managed as ≤90-day central accumulation tanks with floating covers. Section 1.5.4 of these reports describes the LCTs as follows.

> "The Leachate 90-Day Accumulation Tank is a bolted, corrugated steel tank, approximately 100 feet in diameter, with a side wall height of 8 feet 2 inches. The tank is designed to include a dual containment liner system that will act as the floor of the tank and will be bolted to the top of the tank side wall."
>
> "The tank side wall is designed to be bolted to a 1.5-foot thick, 4.5-foot-deep concrete ringwall foundation to accommodate the hydrostatic pressure of the leachate. In addition, the top edge of the tank ringwall includes angle bracing, bolted around the tank perimeter to provide rigidity in the side wall to resist wind loads on the exterior of the tank. The maximum operating level of the tank is approximately 6 feet 2 inches; however, the tank is designed for a maximum water level of 8 feet 2 inches. The tank has a working capacity of 375,000 gallons. The volume is based upon the requirements to handle the amount of leachate needed to be removed within 24 hours after a peak storm event (calculated to be 269,000 gallons)."

The LCT foundation is considered to be a concrete ringwall per American Water Works Association design standard (AWWA) D103-97, *Factory-Coated Bolted Steel Tanks for Water Storage*. The tank gravity loads, including both water load and tank dead loads, and the resulting hoop tension, were considered in the design of the concrete ringwall foundation.

Section 2.2.4.4 of RPP-RPT-25837 and RPP-RPT-27414 further describes the LCTs as follows.

> "The Leachate 90-Day Accumulation Tank is designed such that the inner geomembrane liner and floating cover provide the primary containment. The second geomembrane liner in association with the Leachate Tank Leak Detection Penetration (Drawing H-2-830850) and Combined Sump provide the secondary containment. The outside bolted, corrugated steel frame attached to a concrete ringwall foundation provide the framework to support the tank."

Appendix 4A, Section 1, of the RCRA Permit, OUG-11, contains the Phase I Critical Systems Design Report for IDF. Section 6.4 of this document describes the approved design of the LCTs and their secondary containment system. Section 6.4.4.3 states, "The leachate tank liner system will be subject to

continuous monitoring through the tanks' LDS." Section 6.4.4.4 describes the LCT leak containment system as follows.

> "The HDPE [high-density polyethylene] drainage net between the primary and secondary liner will allow leachate that leaks through the primary liner to drain to the center of the tank. At the center of the tank under the secondary liner will be a depression in the underlying granular backfill that will form a shallow sump. The leak detection pipe will connect to the secondary liner at this sump location and convey leaking leachate to the leak detection chamber of the combined sump."

Figure 1. Illustration of Leachate Collection Tank.

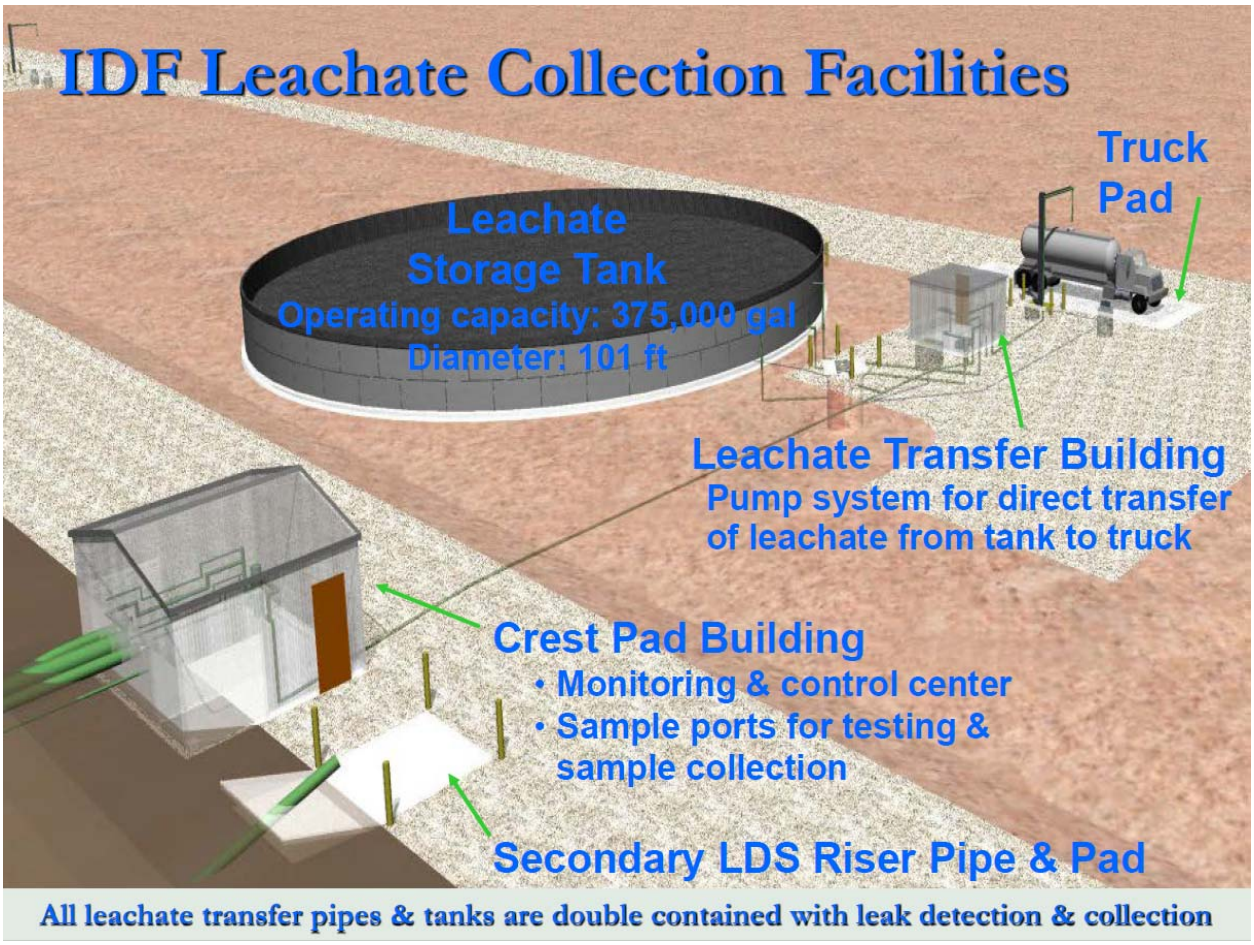
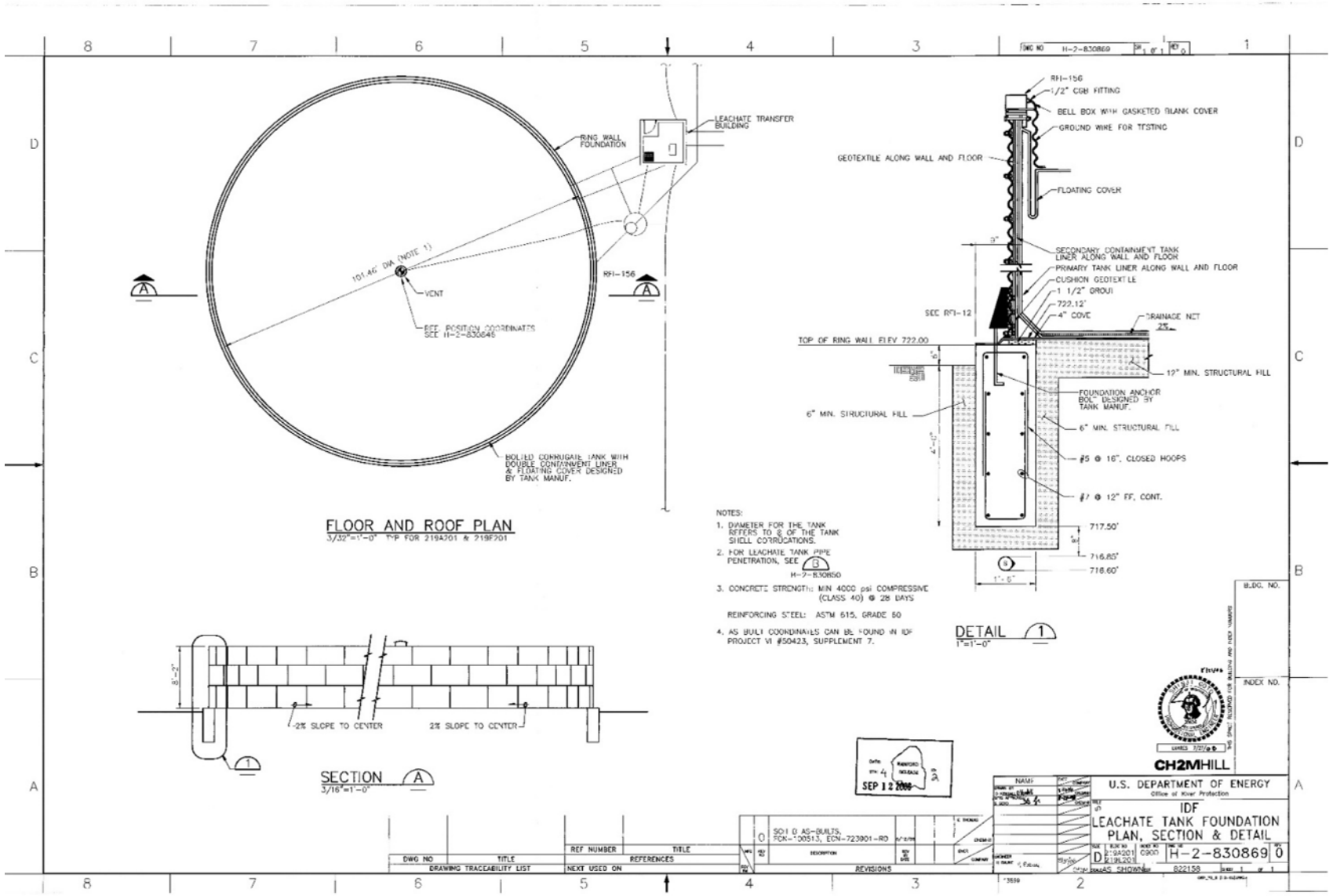


Figure 2. Detailed Drawing of Leachate Collection Tank (H-2-830869).



As described in Section 2.2.4.4 of RPP-RPT-25837 and RPP-RPT-27414, "If the failure of the tank's primary liner is a small leak, the secondary liner will collect the leachate and transport it to the pipe at the tank's center which drains to the combined sump." Section 6.4.3.5 of the Phase I Critical Systems Design Report and Section 1.5.3 of RPP-RPT-25837 and RPP-RPT-27414 describe this combined sump as a 42-in. diameter HDPE manhole placed within a 76-in. diameter HDPE manhole. The secondary containment of the LCTs will drain to the annular space between the two manholes, which will include instrumentation to detect leachate and alarm accordingly.

Section 2.2.4.4 of RPP-RPT-25837 and RPP-RPT-27414 goes on to state,

> "At the sump, the leachate can be pumped out. If there was a large leak in the primary liner and operations staff could not immediately pump out the leachate tank from the Combined Sump, the valve on the tank leak detection pipe could be closed to collect any release within the secondary liner. All leachate from the tank can be rerouted by valving in the leachate transfer pump station to allow direct pumping to a tanker truck at the Truck Loadout Station."

4.0 Classification of the IDF LCT DWMUs

Recent discussions between Ecology and DOE about the classification of the LCTs have focused on whether the LCTs should be identified as miscellaneous units, tanks, or surface impoundments. Each of these types of units is discussed in the following sections.

4.1 Miscellaneous Units

Miscellaneous units are defined by what they are not. Miscellaneous units are not tanks, surface impoundments or any other units defined by the Hazardous Waste Management Act. Miscellaneous units are a catch-all for remaining units. As defined in WAC 173-303-040, "a miscellaneous unit is a DWMU where dangerous waste is treated, stored, or disposed of, and that is not a tank, surface impoundment, or other distinctly named type of unit, device, or facility."

4.2 IDF LCTs Meet the Definition of Tanks and Are Not Surface Impoundments

As defined in WAC 173-303-040, "'Tank' means a stationary device designed to contain an accumulation of dangerous waste, and which is constructed primarily of nonearthen materials to provide structural support." This is consistent with the EPA interpretation of what constitutes a tank. The description and design of the IDF LCTs satisfy the above requirements to be considered self-supporting tank systems that have undergone tank system integrity assessments (RPP-RPT-25837 and RPP-RPT-27414), which demonstrated that the tanks meet the structural design standards of WAC 173-303-640(2)(c).

A surface impoundment is defined as "a facility or part of a facility which is a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials (although it may be lined with man-made materials), and which is designed to hold an accumulation of liquid wastes or wastes containing free liquids. The term includes holding, storage, settling, and aeration pits, ponds, or lagoons, but does not include injection wells."[1]

[1] WAC 173-303-040

EPA addressed questions from the regulated community about the characteristics that differentiate surface impoundments and tanks/tank systems. Information from EPA documents that pertains to classification of the IDF LCTs is addressed in the following paragraphs.[2]

The April 8, 1983, EPA Memorandum 9483.1983(01) provides EPA guidance clarifying how to determine whether a unit is a surface impoundment or a tank. This memorandum states,

> "Distinguishing a tank from a surface impoundment is…primarily an assessment of what provides the unit's structural support. In making this assessment, the unit should be evaluated as if it were free standing, and filled to its design capacity with the material it is intended to hold. If the walls or shell of the unit alone provide sufficient structural support to maintain the structural integrity of the unit under these conditions, the unit can be considered a tank. Accordingly, if the unit is not capable of retaining its structural integrity without supporting earthen materials, it must be considered a surface impoundment."[3]

The IDF LCTs do not meet the WAC 173-303-040 definition of surface impoundment: "a facility or part of a facility which is… formed primarily of earthen materials (although it may be lined with man-made materials)." No component of the IDF LCTs is formed of earthen materials. Therefore, in accordance with EPA guidance, the IDF LCTs meet the criteria to be considered tanks, but do not meet the definition of surface impoundments. Thus, the tank storage handling code, S02, should apply to the LCTs.

5.0 Tank System Integrity Assessments

Ecology has expressed concerns about whether the design of the IDF LCTs meets the design requirements of WAC 173-303-640. As documented in the design assessment reports, the IDF LCTs do meet the design requirements. Section 2.0 of RPP-RPT-25837 and RPP-RPT-27414 contains a detailed assessment of the IDF leachate system design against the tank requirements of WAC 173-303-640. These IQRPE design assessment reports identify that the scope of the IQRPE review included (among other things) the LCT foundation, steel tank structure, primary and secondary liner, floating cover, and tank inlet and outlet connections. The IQRPE segregated the design assessment into the following categories as directed by Ecology Publication No. 94-114, *Guidance for Assessing and Certifying Tank Systems*:

- Structural Design Standards
- Waste Compatibility
- Pressure Control System
- Secondary Containment System
- Ancillary Equipment Design
- Corrosion Assessment.

Section 3.0 of these reports contains the design review assessment certifications by an IQRPE that the LCT system design has been assessed to be in compliance with WAC 173-303-640, as applicable. The certified design is also reflected in the details of the existing and approved OUG 11 portion of the RCRA Permit. Therefore, the IDF LCT design has been certified to comply with Ecology dangerous waste tank system standards.

[2] In EPA Memorandum 9483.1983(01), OSWER Directive No. 9483.01(83), and EPA Memorandum 9432.1994(02)
[3] See Also OSWER Directive No. 9483.01(83) April 15, 1983.

6.0 Ecology Concerns

In recent discussions, Ecology has identified concerns related to LCT system compliance with the tank secondary containment requirements of WAC 173-303-640(4)(d) and by extension WAC 173-303-640(4)(e). WAC 173-303-640(4)(d) states that secondary containment for tanks must include one or more of the following devices:

(i) A liner (external to the tank);
(ii) A vault;
(iii) A double-walled tank; or
(iv) An equivalent device as approved by the department.

WAC 173-303-640(4)(e) expands on the requirements for liners, vaults, and double-walled tanks.

Although the LCTs are equipped with a dual-liner system and external steel support wall, they do not have a liner external to the free-standing tank structure (e.g., a liner under the tank in conjunction with berms, dikes, or catchment basins). The LCTs do not use vaults for secondary containment. Nor can the LCTs be considered traditional double-walled tanks. However, as evidenced by the IQRPE certifications and the incorporation of the design into the Ecology-approved RCRA permit, the LCT system is equipped with an equivalent secondary containment system that meets the intent of the secondary containment requirements for detection and collection of leaks. Specifically, the LCT secondary containment system is

- Designed to contain one hundred percent of the capacity of the LCTs,
- Designed with excess capacity to contain precipitation from a twenty-five-year, twenty-four-hour rainfall event,
- Free of cracks or gaps,
- Designed of an impermeable material that is chemically compatible with the stored waste, and
- Is equipped with a continuous leak detection system capable of detecting a release within twenty-four hours.

The LCT system has operated as a reliable component of the IDF since the fall of 2006 (almost 14 years), collecting leachate resulting from precipitation into the open and unused landfill cells. Based on the demonstrated reliability of the system and the information provided in this section regarding requirements for equivalent devices, DOE is requesting Ecology approval to permit the LCT systems as tank/tank systems, as allowed at WAC 173-303-640(4)(d)(iv).

7.0 Summary

In response to Ecology's request, DOE has agreed to add the IDF LCTs to the OUG 11 portion of the RCRA permit. Ecology and DOE have had discussions about whether the LCTs should be permitted as tanks, surface impoundments, or miscellaneous units. This paper reviews the WAC 173-303-040 definitions for each of these types of units, relevant EPA guidance, LCT design information, and the results of IQRPE design assessment reports for the LCTs.

The IDF LCTs are free-standing structures constructed of nonearthen materials. Therefore, by WAC 173-303-040 definitions and consistent with EPA guidance and directives, the LCTs are not surface

impoundments. Similarly, because the LCTs can be considered tanks and meet tank standards, they cannot be permitted as miscellaneous units.

The LCT system has operated as a reliable component of the IDF since the fall of 2006 (almost 14 years), collecting leachate resulting from precipitation into the open and unused landfill cells. The LCT system was IQRPE-certified as having sufficient structural strength, and compatibility with the waste to be stored, to ensure that the LCTs will not collapse, rupture, or fail, as required by WAC 173-303-640(2)(c). Regular maintenance and inspection of the system and periodic replacement of the LCT liners will provide assurance that the system remains in good working order.

The IQRPE certification of the LCT systems include confirmation that the secondary containment system was designed and installed to meet the requirements of WAC 173-303-640(4)(b). The certified design is also reflected in the details of the existing and approved OUG 11 portion of the RCRA Permit. Because the LCTs do not technically meet the requirements of a double-walled tank, DOE and CHPRC request that Ecology approve in writing that the LCTs are equipped with an equivalent secondary containment device as allowed by WAC 173-303-640(4)(d).

In summary, the LCTs meet all applicable dangerous waste tank standards to be permitted as tank systems, and they are not surface impoundments or miscellaneous units. Therefore, the tank storage handling code, S02, should apply to the IDF LCTs.

8.0 References

20-NWP-047, 2020, Department of Ecology's (Ecology) Completeness Review for the Operations Class 3 Permit Modification for the *Hanford Facility Resource Conservation and Recovery Act Permit, Dangerous Waste Portion, Revision 8C, for the Treatment, Storage, and Disposal of Dangerous Waste,* Part III, Operating Unit Group 11, Integrated Disposal Facility (IDF) Permit, WA7890008967 (letter to Brian T. Vance, U.S. Department of Energy, Richland Operations Office, and Ty Blackford, CH2M HILL Plateau Remediation Company, from Stephanie Schleif), Washington State Department of Ecology, Richland, Washington, March 6. Available at: https://pdw.hanford.gov/document/AR-03596.

40 CFR 146, "Underground Injection Control Program: Criteria and Standards," *Code of Federal Regulations*. Available at: https://www.govinfo.gov/content/pkg/CFR-2010-title40-vol22/xml/CFR-2010-title40-vol22-part146.xml.

AWWA D103-97, 1998, *Factory-Coated Bolted Steel Tanks for Water Storage*, American Water Works Association, Denver, Colorado.

H-2-830850, 2006, *IDF LCRS/LDS Sections and Details*, Sheet 1 of 1, Revision 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: https://fortress.wa.gov/ecy/nwp/permitting/hdwp/rev/8c/IDF/IDF_CH_04A3.pdf.

H-2-830869, 2006, *IDF Leachate Tank Foundation Plan, Section & Detail*, Sheet 1 of 1, Revision 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: https://fortress.wa.gov/ecy/nwp/permitting/hdwp/rev/8c/IDF/IDF_CH_04A3.pdf.

Ecology Publication No. 94-114, 2014, *Guidance for Assessing and Certifying Tank Systems*, Hazardous Waste and Toxics Reduction Program, Washington State Department of Ecology, Olympia, Washington. Available at: https://fortress.wa.gov/ecy/publications/documents/94114.pdf.

EPA, 1983, *Definition of Tank and Surface Impoundment*, OSWER 9483.01(83), U.S. Environmental Protection Agency, Washington, D.C. Available at: https://nepis.epa.gov/Exe/ZyPDF.cgi/91015KX4.PDF?Dockey=91015KX4.PDF.

EPA, 1983, *Determination of Tanks vs. Surface Impoundments*, Memorandum 9483.1983(01), U.S. Environmental Protection Agency, State Programs and Resource Recovery Division. Available at: https://rcrapublic.epa.gov/files/12104.pdf.

EPA,1994, *Clarification of the Regulatory Status of a Refinery Ditch System*, Memorandum 9432.1994(02), U.S. Environmental Protection Agency, Office of Solid Waste. Available at: https://rcrapublic.epa.gov/files/13669.pdf.

RCW 70.105, "Hazardous Waste Management," *Revised Code of Washington*, Olympia, Washington. Available at: http://apps.leg.wa.gov/RCW/default.aspx?cite=70.105.

RPP-RPT-25837, 2005, *Independent Qualified Registered Professional Engineer Design Assessment Report for the Integrated Disposal Facility (IDF) Leachate Tank System (Cell 1)*, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington.

RPP-RPT-27414, 2006, *Independent Qualified Registered Professional Engineer Design Assessment Report for the Integrated Disposal Facility (IDF) Leachate Tank System (Cell 2)*, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington. Available at: https://pdw.hanford.gov/document/AR-03868.

WA7890008967, *Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit, Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous Waste, OUG 11*, Revision 8C, as amended, Washington State Department of Ecology. Available at: https://fortress.wa.gov/ecy/nwp/permitting/HDWP/Rev/8c/IDF/IDF.html.

WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, Olympia, Washington. Available at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-303.

303-040, "Definitions."

303-200, "Conditions for Exemption for a Large Quantity Generator That Accumulates Dangerous Waste."

303-640, "Tank Systems."

303-809, "Research, Development and Demonstration Permits."